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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/072,939	02/01/2002	Guo-Qing Wei	2002P01703US	3791

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EXAMINER	
STREGE, JOHN B	
ART UNIT	**PAPER NUMBER**
2624	

DATE MAILED: 05/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/072,939	WEI ET AL.	
	Examiner	Art Unit	
	John B. Strege	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *07 December 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Response to Amendment

The amendment received 2/27/06 has been entered in full.

Response to Arguments

Applicant's arguments filed 2/27/06 have been fully considered but they are not persuasive. Specifically the applicant argues that the examiner's interpretation of Shiota as addressing intensity normalization of an entire input image relative to a training set is unreasonable. Examiner respectfully disagrees. Specifically Shiota refers to a process to remove differences in conditions of image pickup from the face images due to lighting conditions which is a normalizing procedure (paragraph 6). The remaining arguments have been considered, but are moot in view of the new grounds for rejection required due to the amendment.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiota USPGPUB 2002/0006226 in view of Sadovnik et al. USPN 5,497,430 (hereinafter "Sadovnik").

Shiota discloses a system for appearance based object detection (paragraph 55), the system comprising: a training unit for training images comprising at least eigenimages (paragraph 16); and a detection unit responsive to an input image, which input image has a different brightness and contrast (paragraph 6) than the trained images, for detecting objects corresponding to the trained images (paragraphs 54 and 55). Shiota further discloses in figure 5 that the image is projected to the dictionary space in step S14 and in step S16 the image is transformed to the shape of an input image. Shiota does not explicitly disclose that the transform is achieved by adding a scaling and a shift to image intensity, however it is conventional practice in image processing to do so.

Sadovnik discloses a method for image recognition using invariant feature signals in which the shifting and scaling of a transform equation are disclosed (col. 7 lines 5-55). This allows for the normalized intensity output data to be identical regardless of the presented input image transformation (col. 7 lines 50-55).

Shiota and Sadovnik are analogous art because they are from the same field of endeavor of facial image processing for recognition purposes.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Shiota and Sadovnik to add a scaling and a shift to image intensity. The motivation for doing so is that it will make the normalized output data identical regardless of the presented input image transformation. Thus it would have been obvious to one of ordinary skill in the art to combine Shiota and Sadovnik to obtain the invention as specified in claim 7.

Claim 8 is dependent on claim 7 anticipated above by Shiota. Regarding claim 8, it is a matter of design choice as to what type of image is used with the system as specified by Shiota. As disclosed by Shiota, the shade component removing apparatus is applicable to images other than face images. Thus it would have been obvious to one of ordinary skill in the art to use a single-photon emission computed tomography image with the system in order to carry out recognition procedures on the image.

Regarding claim 9, as seen in figure 1 Shiota discloses a CPU (101).

2. Claims 1,3-4,10-12,14-15,18, and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiota USPGPUB 2002/0006226, in view of Sadovnik et al. USPN 5,497,430 (hereinafter "Sadovnik"), and further in view of Lowe USPN 6,711,293.

Shiota discloses a method for brightness and contrast normalization in appearance based object detection, the method comprising: extracting a plurality of training images (paragraph 16, and paragraphs 53-54); finding eigenimages corresponding to the training images (paragraph 16, and paragraph 60); receiving an input image (paragraph 16); forming a projection equation responsive to the eigenimages (paragraph 16); solving for intensity normalization parameters (examiner interprets the process of removing shade from the image [paragraphs 61-63] as intensity normalization since it is described as a process to remove difference in conditions of image pickup since the light directions on an object differ [described in paragraph 6]); and computing projected and normalized images (paragraph 58, and 61).

Shiota further discloses in figure 5 that the image is projected to the dictionary space in step S14 and in step S16 the image is transformed to the shape of an input image. Shiota does not explicitly disclose that the transform is achieved by adding a scaling and a shift to image intensity, however it is conventional practice in image processing to do so.

Sadovnik discloses a method for image recognition using invariant feature signals in which the shifting and scaling of a transform equation are disclosed (col. 7 lines 5-55). This allows for the normalized intensity output data to be identical regardless of the presented input image transformation (col. 7 lines 50-55).

Shiota and Sadovnik are analogous art because they are from the same field of endeavor of facial image processing for recognition purposes.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Shiota and Sadovnik to add a scaling and a shift to image intensity. The motivation for doing so is that it will make the normalized output data identical regardless of the presented input image transformation.

Shiota does not explicitly disclose computing an error-of-fit of the projected and normalized images; thresholding the error-of-fit; and determining object positions in accordance with the thresholded error-of-fit. Lowe discloses an invention relating to object recognition for use in locating an object in an image (col. 1 lines 14-16). Lowe teaches that with existing systems used for object recognition impose restrictions on how computer vision systems may be implemented, and that what would be desirable is a computer vision system which is operable to determine the presence or absence of an

object, in an image taken from virtually any direction, and under varying lighting conditions (col. 1 lines 30-40). Specifically Loew discloses finding an error residual or degree of correlation (error-of-fit), thresholding the error residual, and if the error residual is determined to be less than the threshold value then the processor indicates the location, size, and orientation of the object (col. 11 line 1-35).

Shiota, Sadovnik, and Loew are analogous art because they are from the same field of endeavor of object recognition.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Shiota, Sadovnik and Loew to find an error-of-fit, threshold the error of fit, and determine the position of the object in accordance with the thresholded error of fit. The motivation is that it would remove the restrictions of the existing systems and make the invention easier to use. Thus it would have been obvious to one of ordinary skill in the art to combine Shiota, Sadovnik, and Loew to obtain the invention as specified in claim 1.

Regarding claim 3, it is a matter of design choice as to what type of image is used with the system as specified by Shiota and Loew. As disclosed by Shiota, the shade component removing apparatus is applicable to images other than face images. Thus it would have been obvious to one of ordinary skill in the art to use a single-photon emission computed tomography image with the system in order to carry out recognition procedures on the image.

Regarding claim 4, it would be obvious to one of ordinary skill in the art to represent the error-of-fit with a score image in order to better be able to see if the object to be recognized matches, thus the examiner declares official notice.

Claim 10 is dependent on claim 7 anticipated by Shiota. Shiota discloses a CPU 101, an Output unit 105 for displaying the input image. Shiota does not explicitly disclose providing an indication of the location of the detected object within the input image. Loew discloses finding the location of the detected object in the input image (col. 11 lines 32-35). The motivation for combining Shiota and Loew was given above and applies to the limitations of claim 10 as well.

Regarding claim 11, Loew discloses a keyboard in figure 1 which is a user interface adapter.

Claim 12 is similar to claim 1 except claim 12 is a system claim. As both Shiota and Loew disclose a method and apparatus, the same arguments used above apply equally to claim 12.

Claims 14-15 are similar to claim 3-4, thus the same arguments used for claim 3-4 apply equally to claims 14-15.

Claim 18 is similar to claim 1, thus the same arguments used for claim 1 apply equally to claim 18.

Claims 20-21 are similar to claims 3-4, thus the same arguments used for claims 3-4 apply equally to claims 20-21.

3. Claims 5-6,16-17, and 22-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiota USPGPUB 2002/0006226 in view of Waters et al. *Super Resolution and Image Enhancement Using Novelty Concepts* (hereinafter "Waters"), and further in view of Sadovnik et al. USPN 5,497,430 (hereinafter "Sadovnik").

Regarding claim 5, Shiota discloses a method of forming eigenimages, the method comprising: sub-sampling a plurality of training images (figure 2 numeral 111); forming training images in accordance with the subsampled images; and computing eigenimages corresponding to the training images (paragraph 16). Shiota does not explicitly disclose that the eigenimages are for multiresolution, computing coarse eigenimages, interpolating the coarse eigenimages for a finer resolution; orthonormalizing the interpolated images; and providing pseudo-eigenimages corresponding to the orthonormalized images for a finer resolution.

Waters discloses a method that estimates an underlying scene at a spatial resolution that is finer than the basic detector array of a sensor. The novelty concept develops a set of orthogonal eigenimages from a sequence of image frames. The next image is interrogated for novel changes not present in the previous frames and the eigenimages are updated with new information. The known eigenimages are interpolated to provide an estimate of the detector outputs fro arbitrary sensor pointings which can be used to estimate and remove the background from subsequent frames or providing an image of the underlying background at high spatial resolution (all taken from the abstract). The intent of the estimation scheme is to take coarse measurements of a middle image and try to reproduce a higher resolution image (second paragraph

from the bottom of page 125, also see figure 1). Waters further discloses that an orthonormal set of eigenimages can be defined from the single value decomposition of a matrix (first paragraph, second column of page 124).

Shiota and Waters are analogous art because they are both from the same field of endeavor of removing the background from an image.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Shiota and Waters with the motivation being to allow the system of Shiota to give higher resolution images than that capable of the basic detector array of a sensor.

Shiota further discloses in figure 5 that the image is projected to the dictionary space in step S14 and in step S16 the image is transformed to the shape of an input image. Shiota does not explicitly disclose that the transform is achieved by adding a scaling and a shift to image intensity, however it is conventional practice in image processing to do so.

Sadovnik discloses a method for image recognition using invariant feature signals in which the shifting and scaling of a transform equation are disclosed (col. 7 lines 5-55). This allows for the normalized intensity output data to be identical regardless of the presented input image transformation (col. 7 lines 50-55).

Shiota and Sadovnik are analogous art because they are from the same field of endeavor of facial image processing for recognition purposes.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Shiota and Sadovnik to add a scaling and a shift to image intensity.

The motivation for doing so is that it will make the normalized output data identical regardless of the presented input image transformation. Thus it would have been obvious to one of ordinary skill in the art to combine Shiota, Waters, and Sadovnik to obtain the invention as specified in claim 5.

Regarding claim 6, Waters discloses that an orthonormal set of eigenimages can be defined from the single value decomposition of a matrix (first paragraph, second column of page 124).

Claims 16-17 are similar to claims 5-6, thus the same arguments used for claims 5-6 apply equally to claims 16-17.

Claims 22-23 are similar to claims 5-6, thus the same arguments used for claims 5-6 apply equally to claims 22-23.

4. Claims 2,13, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shiota USPGPUB 2002/0006226, in view of Sadovnik et al. USPN 5,497,430 (hereinafter "Sadovnik"), in view of Lowe USPN 6,711,293 and further in view of Waters et al. *Super Resolution and Image Enhancement Using Novelty Concepts* (hereinafter "Waters").

Claim 2 is dependent on claim 1 which has been rejected over Shiota in view of Sadovnik and Lowe. Shiota discloses a method of forming eigenimages, the method comprising: sub-sampling a plurality of training images (figure 2 numeral 111); forming training images in accordance with the subsampled images; and computing eigenimages corresponding to the training images (paragraph 16). Shiota does not

explicitly disclose that the eigenimages are for multiresolution, computing coarse eigenimages, interpolating the coarse eigenimages for a finer resolution; orthonormalizing the interpolated images; and providing pseudo-eigenimages corresponding to the orthonormalized images for a finer resolution.

Waters discloses a method that estimates an underlying scene at a spatial resolution that is finer than the basic detector array of a sensor. The novelty concept develops a set of orthogonal eigenimages from a sequence of image frames. The next image is interrogated for novel changes not present in the previous frames and the eigenimages are updated with new information. The known eigenimages are interpolated to provide an estimate of the detector outputs fro arbitrary sensor pointings which can be used to estimate and remove the background from subsequent frames or providing an image of the underlying background at high spatial resolution (all taken from the abstract). The intent of the estimation scheme is to take coarse measurements of a middle image and try to reproduce a higher resolution image (second paragraph from the bottom of page 125, also see figure 1). Waters further discloses that an orthonormal set of eigenimages can be defined from the single value decomposition of a matrix (first paragraph, second column of page 124).

Shiota and Waters are analogous art because they are both from the same field of endeavor of removing the background from an image.

At the time of the invention it would have been obvious to one of ordinary skill in the art to combine Shiota, Sadovnik, Loew and Waters with the motivation being to allow the system of Shiota to give higher resolution images than that capable of the

basic detector array of a sensor. Thus it would have been obvious to one of ordinary skill in the art to combine Shiota, Sadovnik, Loew, and Waters to obtain the invention as specified in claim 2.

Claim 13 is similar to claim 2 except claim 13 is a system claim. As both Shiota and Loew disclose a method and apparatus, the same arguments used above for claim 2 apply equally to claim 13.

Claim 19 is similar to claim 2, thus the same arguments used for claim 2 apply equally to claim 19.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John B. Strege whose telephone number is (571) 272-7457. The examiner can normally be reached on Monday-Friday between the hours of 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571) 272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JS

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